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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/076,097	02/15/2002	Soo Chang Chang	041501-5494	9123

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EXAMINER

MCDONALD, RODNEY GLENN

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 08/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/076,097	CHANG, SOO CHANG	
	Examiner	Art Unit	
	Rodney G. McDonald	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 May 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Potter (U.S. Pat. 5,262,030).

Potter teaches that in conventional or prior art sputtering system a chamber is evacuated for sputter coating with a substrate held by a substrate holder means 14. The material with which the substrate is to be coated is fabricated into a target 15. This target forms a part of the chamber walls and is insulated from the walls by means 16 and maintained at a suitable negative potential by a power supply 17. A magnetic field 18 which is substantially parallel to the target on the side of the target facing the substrate is generated by an electromagnet comprised of a yoke of magnetizable material 19 and a coil 20. An undesirable characteristic of magnetron sputtering is that the target is eroded more rapidly in regions where the magnetic field is more intense. (Column 1 lines 47-68; Column 2 lines 1-5)

Potter then goes on to teach that his invention is an attempt to improve the prior art by providing a method and means (i.e. electromagnetic coils (see below))

for obtaining more efficient target utilization by being able to vary the location of the magnetic field through external electrical means, and thereby spread the target erosion more uniformly over the surface of the target. (Column 3 lines 1-8)

In accordance with Potter' invention, the magnetic field and associated plasma produced in a magnetron sputter coating system are electrically moved across the face of a suitable large target while the substrates are stationary. The novel apparatus provides a means of creating arbitrary two-dimensional plasma patterns. Specialized versions provide sufficient flexibility for many applications. Examples of specialized versions with one degree of freedom are cathodes in which a plasma of fixed shape may be translated along one axis only, and cathodes where the center of the pattern is fixed but the size of the pattern may be varied. The magnetic structure of the sputter coating apparatus is formed as a backplane of magnetically soft material onto which a large number of poles of magnetically soft material are affixed, and a large number of current carrying coils oriented parallel to that backingplane and encompassing one or more of the poles. The plasma is controlled by selectively energizing these using a computer or other control means. Specific and practical examples of this structure will be described. (Column 3 lines 22-42)

In one application a cathode with two degrees of freedom has the shape of a large rectangle or square and is approximately the size of the pallets used in existing disk sputtering machines. (Column 4 lines 43-46)

Nearly continuous translation of a given field distribution can be achieved by selective activation of the appropriate "magnetic pixels" in analogy with the

cathode ray tube image. The resolution achievable is dependent on the "magnetic pixel" density. Adequate resolution for the sputtering purposes is achievable with commercially viable techniques. (Column 4 lines 16-22)

The third and most general class of cathodes to be described, which incorporates the features of this invention includes those devices in which the magnetic field may be varied in two dimensions. The requirement for such a device is that it be capable of producing an arbitrary magnetic scalar potential on the plane 21 previously used to describe the operation of the more specialized embodiments. For practical purposes, it is sufficient to partition the plane 21 into a number of elements, where each element is small relative to the distance to the region where the magnetic field is to be used, and to provide a means for controlling the potential of each element. Fig. 10 shows the plane 21 partitioned into elements 50 having a square shape. Another example consisting of circular elements 50 arranged in a hexagonal pattern is shown in Fig. 11. (Column 7 lines 28-43)

The design shown in cross-sectional view in Fig. 12A is one means of generating the desired arbitrary potential. It consists of a baseplate 51 to which are attached a number of poles 52 of diameter d , arranged in a hexagonal pattern with lattice constant D . The baseplate and poles are made of a magnetic material such as Carpenter High permeability 49 alloy. Each pole is surrounded by a coil 53, with leads 54 brought through a suitable hole in the baseplate. The poles 52 project through and are sealed to a plate 55 of a nonmagnetic material such as copper. Plate 55 is parallel to baseplate 51 and provides a means of

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confining a flow of cooling water across the back surface of the target 15. Shown in plan view in Fig. 12B is the plane 21 which is convenient for describing the operation of the cathode. Plane 21 is coincident with the plane containing the ends of all the poles 52. (Column 7 lines 44-60)

The differences between the present claims and Potter is that the plurality of electromagnets forming different geometrical group cell patterns including triangular, pentagonal and hexagonal is not discussed, where there is a first cell pattern on the outer perimeter and where there is a second group within a center portion is not discussed and the rows are not discussed.

From Figures 10, 11 and Figures 12A and 12B the examiner understands that there are at least one and two groups of coils which will trace a hexagonal pattern and a triangular pattern by connecting the coil by imaginary lines and that each of the coils are selectably energizable as discussed above for energizing whichever magnets or groups of magnets are necessary in order to achieve uniform target utilization. The selective energization allows for the different group cell patterns to be formed. (See Figures 11, 12A and 12B and discussion about selective energization of coils.)

The motivation for providing different groupings of magnets separately energizable is that it allows for more uniform erosion over the surface of the target. (Column 3 lines 3-8)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Potter by utilizing at least two groups of magnets in certain geometrical positions which are energized as taught

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by Potter because it allows for performing more uniform erosion over the surface of the target.

Response to Arguments

In response to the argument that Potter does not teach having different geometrical group cell patterns, it is argued that Potter teach in Figure 10 that one can selectively energize each magnet and therefore can produce various geometrical patterns on the fixed plate. This compares to Applicant's claims and also to the newly added drawings where different magnets are selectively activated to form different geometric patterns. The grid structure of Applicant's figures compares to the grid structure of Potter's Figure 10. The issue is whether Potter suggests different geometric patterns for his grid in Fig. 10. Potter does in fact suggest that each one of the magnets in the grid can be activated selectively. "Selectively" suggests that some of the magnets in the grids can be activated while others are not. This would yield a grid where certain magnets are activated to have different geometric patterns. For instance certain rows in the grid can be activated while others are not.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory

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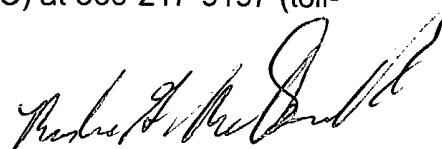
period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
August 19, 2004